

Eco-biogeochemical Lagrangian studies: the role of high resolution altimetry

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SWOT-SDT project GoLSWOT A working group for the AirSWOT experiment over the Gulf of Lion
OSTST project ALTIMECO Exploiting altimetry for ecological studies

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Lagrangian approach

Synthetic trajectories from a velocity field for understanding **transport and mixing**

Advantages

Link altimetry to tracer patterns (other satellite data, in situ)
 Link meso- to submeso-scales

Requirements

Velocity field over a spatial domain (~100-1000 km)
 Temporal variability (several days – several months)

Applications

Exploitation: quantifying the role of transport on biogeochemical and ecological processes, pollutant spill management

Validation: tracer patterns/drifters for validating altimetry products

Synergies: merging multisatellite data (altimetry + SST/OC/SSS..)

Marine biogeochemistry and ecology demand higher resolution altimetry

1. Biogeochemistry: Field campaigns are increasingly targeting the submesoscale

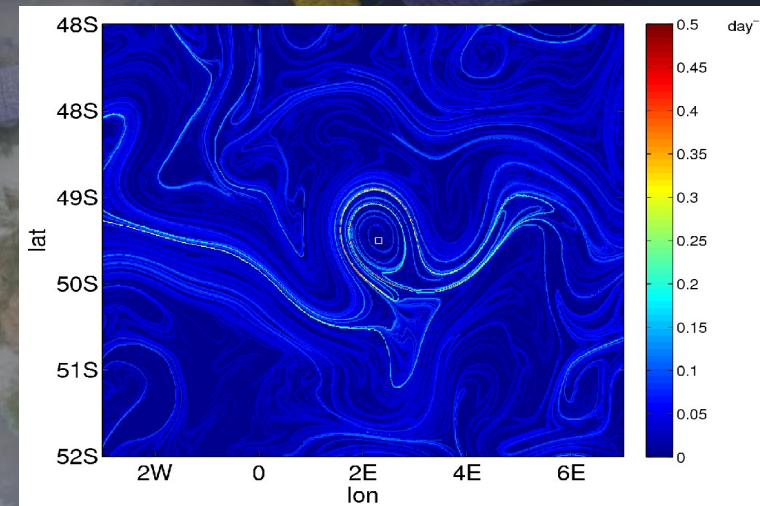
Biogeochemical budgets depend on the precision by which Lagrangian structures can be detected

ARTICLE

doi:10.1038/nature11229

Deep carbon export from a Southern Ocean iron-fertilized diatom bloom

Smetacek et al., Nature, 2012



2. Ecology: The distribution of marine biota is known at increasing resolution (e.g. biologging)

What are the physical features which structure marine communities?

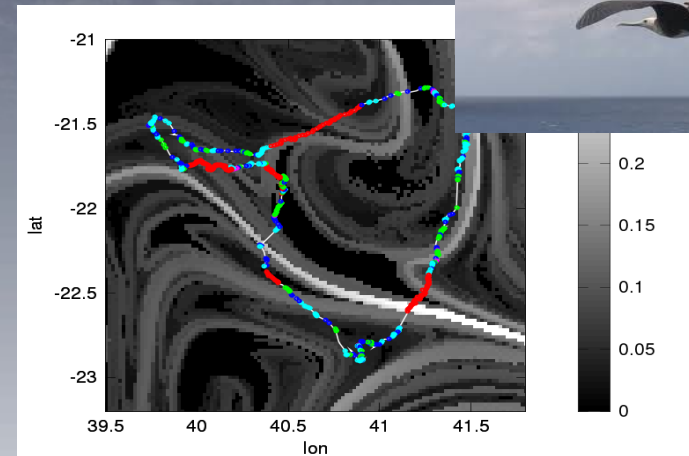
JOURNAL
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Interface



J. R. Soc. Interface
doi:10.1098/rsif.2012.0509
Published online

Frigatebird behaviour at the ocean–atmosphere interface: integrating animal behaviour with multi-satellite data

De Monte et al. J. R. Soc. Interface, 2012



3. Pollutant spills: Lagrangian tools have been proposed to assist responses to fallouts

What are the transport structures at the scale of a pollutant spill (submesoscale or smaller)?

Olascoaga and Haller, PNAS 2012

Lagrangian studies and SWOT

What are minimal requirements for gridded SWOT products in Lagrangian applications?

Domain size

Space: 200-400 km or larger, res: 1-10 km

Time: 2 weeks or longer, res: 1-4 days

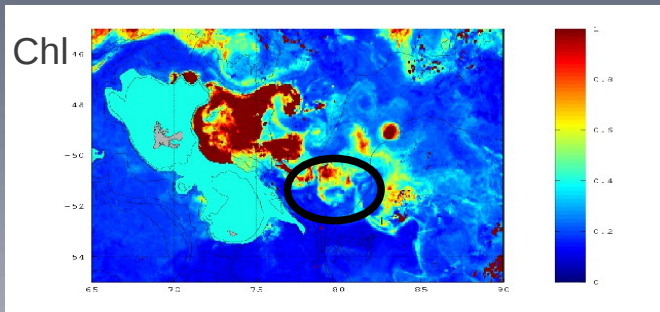
Some workarounds

Synchronize a campaign with SWOT observations on a crossover diamond

Nest SWOT local maps with traditional nadir products (need for a nesting tool)

How Lagrangian tools can complement the fast repeat phase and AirSWOT?

Comparison with tracer distribution



Comparison with in situ Lagrangian structures
Drifters (adaptive scheme) + gliders + towed vehicles
(Gulf of Lion)

